WOMEN'S MATHEMATICS

MAT193H1 | University of Toronto | Fall 2021

What you will learn

This math in this course is inspired by the mathematical contributions of women, while also learning about the lives of those women, gender issues within the field of math, and how this all impacts UofT. You'll learn math not typically seen outside of a math major while enhancing your general academic skills.

What you will read

You will read a selection of book chapters, newspaper articles, and academic articles from several different sources.

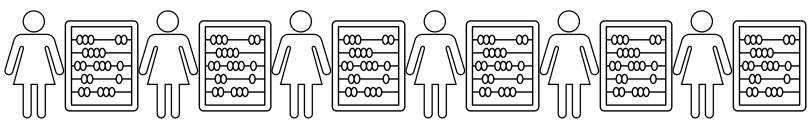
What you will do

Classes will be active and will include student-led math presentations, whole-class discussions, and guest speakers. Outside of class you'll prepare 3 problem sets and 3 projects, and establish baseline knowledge. The projects are about applying what we are learning to the University of Toronto and involve original research.

The Association for Women in Math Logo at the University of Toronto, designed by Ghazal Malekanian

Welcome!

This is a course that I have been thinking about for many years. I first heard of a course about women and math when I was invited to a weekend all about women's influence on mathematics at the Banff International Research Station in 2016 immediately knew that I'd teach something like it some day. Some of the greatest mathematicians in history have been women - but their names are still unknown, even to math students. You might hear that math is a "relatively equitable" subject, because about 50% of math undergrad degrees are awarded to women. But, once you dig below the surface you find this isn't so. Fewer than 30% of math PhDs are awarded to women, and fewer than 15% of professors in elite research institutions are women. This semester we'll celebrate women's accomplishments and look at all that's left to do. Welcome to the course! I look forward to learning with you this semester!



We are In Person!!

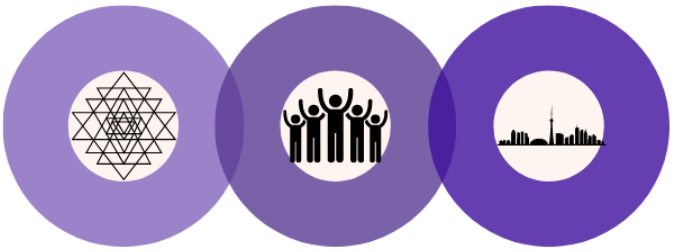
Class Attendance is mandatory. If you cannot make a class meeting due to circumstances email me before class or as soon as possible after class.

I can appreciate that with the excitement of being back in person there is also some nervousness and hesitation. I share this with you.

Masks are an inexpensive and effective measure that limits the spread of COVID and will facilitate the return to normal life as quickly as possible. Failure to wear a mask properly entails unnecessary risks to public health and may disrupt learning by creating unwelcome distractions. It is the policy of the Math Department that in-person instruction cannot take place unless all students are wearing a mask that covers both mouth and nose, with exceptions only for students who have received documented exemptions.

As with other accommodations, any student who has an official exemption from wearing a mask is expected inform the instructor BEFORE classes begin, providing documentation.

I expect that everyone will treat treat others in a polite and respectful manner. I intend to nurture an environment that challenges your ways of thinking and allows you to re-examine your beliefs.

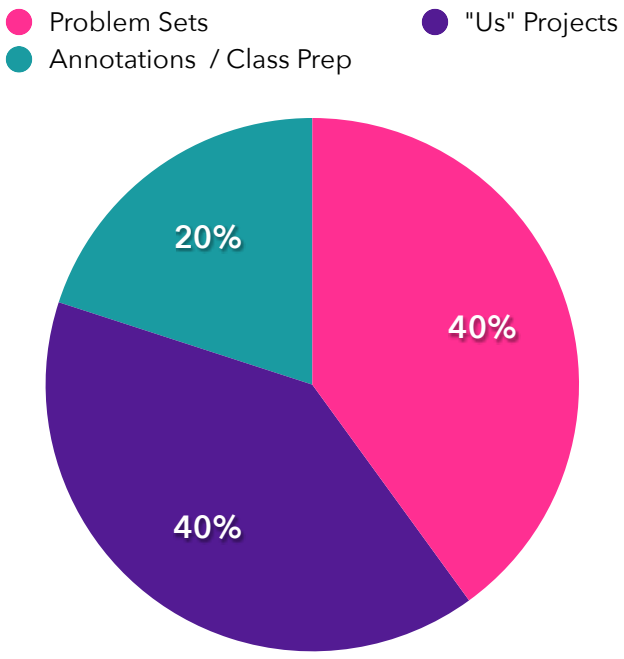


Content Units & Coverage

The schematic above lays out the components of each unit. We will study women's contributions to an area of mathematics, discuss relevant societal or environmental factors, and apply what you are learning to research women in math at UofT, past and present.

The three units of the course are mathematical. They dictate the mathematics that we will approach and the mathematicians that we will cover, but do not directly say anything about society or women at UofT; for this, see the schedule.

- Unit 1: Data
- Unit 2: Symmetry
- Unit 3: Knots



Assessment Information

The breakdown of grades is shown above. In addition, because participation is a key element of being in a seminar, to receive an A in the course you must attend all classes, to receive a B you must attend 10 classes, and to receive a C you must attend 8 classes. Note that you are counted as "attend" if you tell me you will miss class ahead of time, if you have an emergency, or if you attend one of the classes during the first two weeks virtually.

Problem Sets

It is often said that in order to learn math you must do math. This is at the core of my beliefs about how you learn math and how you become a mathematician. If you are going to appreciate the contributions of women in mathematics, you need to engage in math! These problem sets will form the core of your mathematical activities.

You will complete three problem sets this semester. They will contain problems that are inspired by women's contributions to mathematics. Your goal is to first find a solution to the problem and then to communicate your solutions to a peer - someone who is familiar with the "basics" we've talked about in class, but is also a first-year student who doesn't have significant math background. You may choose to either write your solution or to record a video where you explain the solution verbally, with the help of live annotations. We will work on creating a rubric for the problem sets during the first weeks of class.

The problem sets will be scaffolded as follows:

- First week: Before class, you'll tackle the problems. In class, you'll have time to talk about one or two problems that you find the most difficult with a small group of your classmates with the goal of collectively making progress on the problem.
- Second week: Before class, you'll try to solve as many problems as you can. In class, 3-6 students will each lead a discussion about the solutions to the problems by informally presenting their own solutions and gathering other ideas.
- Third week: You will submit your final written or recorded problem set.

"Us" Projects

One of the ultimate goals of this seminar is to take what you learn about women mathematicians and their contributions elsewhere and apply it to the University of Toronto context. I would like you to ask research questions about what is happening at the University and what *has* happened here.

We will follow a research process for the projects:

1. Formulate a research question and write a project proposal

2. Gather data
3. Analyze data
4. Transform data into a representation that is easily understood by audience

These three projects lie somewhere between group projects and individual projects and on the border of original research. You will be accessing and representing knowledge that is not easily found so that it is easier for others to access - this is the research component. Further, you will work as a class to ensure that you are not repeating each others' efforts. How much you choose to truly work collaboratively - in pairs, in trios, or so on - is up to you, but I expect that if you work in larger groups your efforts will reflect this collaboration and that you will be responsible for ensuring that the collaboration goes smoothly.

The three projects are:

- Data Visualization: In this project you will gather data related to women in mathematics at UofT. There are several directions you can go with this project and several different types of data you can gather.
- Archives: We will dig into the University of Toronto Archives for this project, and see what information we can find about women who have worked at the University in the past.
- Impact: After all that you have learned about women in mathematics in general, what impact can you have locally? You'll identify a problem related to women or girls and math that you would like to tackle and propose a partial solution to it that you can implement at the end of the semester. If feasible, you may also be able to measure the impact of your solution.

Annotations / Class Preparation

For a seminar course in particular, it is absolutely vital that you be prepared. If you are not prepared you cannot participate fully in class.

As academics (students and professors, members of a University community) we engage in academic conversations. Part of this is that we are grounded in conversations that others have had before us. This is why we read. Academic book chapters and articles are part of conversations. By reading them we get a glimpse into the questions, issues, and arguments that academics are having so that we can then continue them ourselves.

The reading - and any other pre-class preparation, like videos or podcasts - is assigned on Perusall, a program that allows you to talk about the reading with your classmates. You can also tag me to ask questions. You will read a selection of book chapters, newspaper articles, and academic articles from several different sources.

What you will learn

Fundamental Knowledge:

- Identify women who have made contributions to mathematics, in history and in current times, far-flung and local
- Discuss some of the representations of mathematical ideas in data visualization, group theory, and knot theory, and identify where the translation from one representation to another occurs.
- Explain some factors contributing to women's lower rates of participation in mathematics

Application:

- Solve mathematical problems inspired by women's mathematics
- Critique mathematical experiences and depictions of mathematicians
- Use mathematical tools to represent and understand data related women in math, generally and at the University of Toronto
- Design an intervention to impact the knowledge of or representation of women in math at UofT.

Integration:

- Identify similarities and differences between mathematics and other fields of study.
- Build tools to understand data from different fields of study.

Human Dimension

- Come to see yourself as a capable mathematician
- Come to see yourself as part of the history at the University of Toronto and, if applicable, as part of the community of women at the University

Caring

- Value mathematics and mathematical thinking as human endeavours
- Be more interested in barriers that may prevent women and girls from fully participating in academic life, and work to remove these barriers in your own life beyond this course.

Learning How to Learn

- Develop skills to critically evaluate quantitative texts
- Identify the steps of an academic inquiry and frame useful questions to begin.

Books and Readings

There is no required textbook or books for the course. You will read a selection of book chapters, newspaper articles, and academic articles from several different sources.

About Me & Course Contact Information

I'm a mathematician and a professor in the Department of Mathematics. I was awarded my doctorate in math in 2013 from the University of Michigan with a thesis entitled *The Asymptotic Behaviour of Generic Initial Systems.* I enter into the study of math in literature (and literature in math) from this perspective; indeed, this is a math course and you can expect to learn a lot of math.

After I received my PhD I begun teaching at Quest University Canada - in large part because I wanted to teach a lot of First-Year Seminars and learn how to design courses like this from experts! I taught there for four years. It was at Quest that I really began to learn the importance of gender issues in math. First,

since I was teaching many students who would normally never take mathematics, I heard about a lot of ways that girls dropped out of math due to social issues or expectations that were different from my experiences. Second, I experienced blatant gender discrimination personally for the first time. Students accused me - and another younger woman STEM colleague - of not knowing what I was teaching and had different expectations of me than of my male colleagues. Also, *some* of my colleagues (not all!) thought that the solution to these issues was to just act more like a man! While Quest was overall a wonderful experience of growth in teaching, these issues began my journey towards interest in women in math.

At UofT I've continued to be involved with Women in Math and other diversity initiatives across campus. The more I learn, the more passionate I become! I balance my passion and advocacy with education, and work to become educated

IF you have a question about the course, ask it on Piazza first. If it is confidential , email me (not Quercus inbox - I don't check it and won't ever get your message): smt@math.toronto.edu. Please put MAT193 in the title so I know what course you are talking about! But, before you email me, make sure you've read this syllabus, checked course announcements, and looked on the course website. A prerequisite to being a scholar is being able to find information for yourself, and I will expect that you have checked those places first. If you do not receive a response, it is likely because the information is already available online somewhere.

You should call me "Professor Mayes-Tang" or "Dr. Mayes-Tang."

Succeeding in this Seminar

This seminar does not require any prerequisites in math, English, or any other subject. This means that the most important things that you can bring to the course is your unique strengths and your engagement. Make sure that you take advantage of the unique opportunities that being in a first-year seminar offers! And make sure that you work with others. The syllabus says below what is and is what not a violation of academic integrity: if you have any questions about whether working with someone on an assignment is allowed or not, ask me!

Important Course Policies

Academic Integrity & What It Means in This Course

Academic integrity is fundamental to learning and scholarship at the University of Toronto and beyond. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the U of T degree that you earn will be valued as a true indication of your individual academic achievement, and will continue to receive the respect and recognition it deserves. Violating standards of academic integrity will prevent you from learning material, refining your problem-solving skills, and developing self-sufficiency and self-esteem.

I am strongly committed to assigning grades based on students' honest efforts to demonstrate learning in this course. Academic dishonesty in any form will thus not be tolerated in this course.

Students are expected to know what constitutes academic integrity: familiarize yourself with the information available at this site. It is the rule book for academic behaviour at the U of T. Potential offences include, but are not limited to:

- Having another student, stranger, or someone else write a paper or assignment for you (in part or in full)
- Copying or paraphrasing a source without citing it
- Allowing someone else to copy the ideas in your journal, papers, or other assignments
- Taking unattributed text from somewhere else
- Misrepresenting reasons for being late or absent for a class or presentation

The following actions are NOT offences in this class.

• Discussing questions from homework with classmates, building off of each others' ideas

- Using online resources to help you understand the content of the course or homework problems
- Using sources for ideas and quoting them with citations

In accordance with the University's Code of Behaviour on Academic Matters, we will actively investigate any suspected cheating, plagiarism, misrepresentation or other dishonest practices. The consequences for academic misconduct can be severe, including a failure in the course, a notation on your transcript, suspension, and expulsion.

If you have any questions about what is or is not permitted in this course, please do not hesitate to contact your me. Students are usually reluctant to report incidents of academic dishonesty. As we are working together to preserve the fairness of this course, I encourage you to let me know (anonymously, if

necessary) if you observe behaviour that you feel might be unethical. Your name will be held in confidence.

Academic Accommodations

If you have a documented academic accommodation please share your letter from Accessibility Services with me as soon as you can in the term so that we can work together to provide an equitable learning environment for you. If you suspect that you need academic accommodations, I encourage you to contact the Accessibility Services office.

Due Dates & Late Policy

We set due dates so that you keep up with the course and for practical reasons - like ensuring that students are prepared for a peer review session. We will accept requests for extensions on late work submitted via a form on the website, and trust that you have a good reason (e.g. medical trauma, personal crisis) for submitting an assignment late. Some limits to this policy (that is, places where it is not reasonable or fair to accept late work) are outlined below.

- When another member of our class depends on you for their work (e.g. peer review) due dates will be very strictly enforced by us. This is because it is not fair to your tutorial mates. That means that we will not be able to accept late drafts for peer review for any reason.
- All term work must be completed before the end of classes.
- If you have an official academic accommodation that impacts late work, your Accessibility Advisor needs to be aware of the extension request, so you should also file a form signed by them from Accessibility Services.

Verification of Illness Forms

Please note that Verification of Illness forms(also known as a “doctor’s note”) are temporarily not required.Students who are absent from class forany reason(e.g., COVID, cold, flu and other illness or injury, family situation) and who require consideration for missed academic work should report their absence through the online absence declaration. The declaration is available onACORNunder the Profile and Settings menu.